Citation:

Wannamethee SG, Shaper AG. Alcohol, body weight, and weight gain in middle-aged men. *Am J Clin Nutr*. 2003 May; 1312-7.

PubMed ID: 12716687

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

- To examine the relation between alcohol intake (including types of alcohol consumed) and body weight, and the association between changes in alcohol intake and in body weight over 5 years of follow up in middle-aged British men

Inclusion Criteria:

- British men aged 40 - 59 years
- Men with preexisting cardiovascular disease or receiving regular medical treatment were not excluded

Exclusion Criteria:

- Persons with known diabetes (n = 118)
- Persons with no data on BMI (n = 3)

Description of Study Protocol:

Recruitment

The British Regional Heart Study is a prospective study of cardiovascular disease involving 7,735 men aged 40 - 59 years selected from the age-sex registers of one group general practice in each of 24 towns in England, Wales and Scotland and examined in January 1978 through July 1980.

Design: Prospective Cohort Study

At initial screening (Q1) and screening 5 years later (Q5), men were classified into 5 groups according to estimated reported weekly alcohol intake, as follows:

- None
- Occasional (<1 unit/week)
- Light-moderate (1-20 units/week), including weekend drinkers of 1-2 or 3-6 units/Dau and daily drinkers of 1-2 units/day
- Heavy (21-42 units/week), including weekend drinkers of >6 units/day and daily drinkers of 3-6 units/day
- Very heavy (<42 units/week), comprising daily drinkers of >6 units/day

Subjects were classified into weight change categories (based on percentage change in body weight since screening) as follows:

- Weight loss (defined as a lose of ≥4% of body weight)
- Stable
- Gain of 4-10%
- Gain of >10% of body weight

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- ANCOVA was used to obtain adjusted means by alcohol categories
- Logistic regression was used to obtain adjusted relative odds (odds ratio) of weight gain and high BMI (>28 kg/m^2) for the alcohol categories, with adjustment for potential confounders
- Tests for trends were assessed by fitting alcohol as a quantitative variable
- Direct standardization was used to obtain age-adjusted rates, and tests for trends of age-adjusted rates were performed

Data Collection Summary:

Timing of Measurements

- At baseline (1978 - 1980), research nurses administered a standard questionnaire that included questions on smoking habits, alcohol intake and medical history.
- Physical measurements were made and nonfasting blood samples were taken
- 5 years after screening (1983 - 1985), men completed a postal questionnaire on changes in alcohol intake, body weight, and medical history, similar to one completed at baseline.

Dependent Variables

- Body weight, height, BMI (measured at baseline, self-reported at 5 years)
- Weight change

Independent Variables

- Alcohol intake recorded by using questions on frequency, quantity and type
- Validated using biochemical and hematologic information from blood sampling
- Changes in alcohol intake

Control Variables

- Age
- Initial BMI
- Smoking habits
- Longest held occupation/social class
- Usual frequency and type of physical activity

Description of Actual Data Sample:

Initial N: Data on alcohol intake were available for 7,729 of the 7,735 men at baseline. 7,608 men were available for baseline analyses.

Attrition (final N): 7,275 men available after 5 years. 6,832 men with data on weight change.

Age: aged 40 - 59 at baseline

Ethnicity: not mentioned

Other relevant demographics:

Anthropometrics

Location: England

Summary of Results:

Key Findings:

- Age-adjusted mean BMI and the prevalence of men with a high BMI at baseline (≥ 28 kg/m^2) increased significantly from the light-moderate to the very heavy alcohol intake group even after adjustment for potential confounders.
- Similar patterns were seen for all types and combinations of alcohol.
- After 5 years of follow-up, stable and new heavy drinkers (including very heavy drinkers of ≥ 30 g/day) showed the greatest weight gain and had the highest prevalence rates of high BMI.
- The age-adjusted relative odds of gaining weight (≥4% of body weight) over the 5-year period was greatest in stable and new heavy drinkers compared with stable none-occasional drinkers.
- Weight change patterns in heavy drinkers at baseline who reduced their intake were not significantly different from those in the stable none-occasional group but showed more weight loss and less weight gain than in the stable or new heavy drinkers.
- In all 3 baseline BMI categories (<25, 25 - 27.9, and ≥28), stable heavy and new heavy drinkers showed the highest relative odds of weight gain of all stable or changed alcohol groups compared with stable none-occasional drinkers: 1.16, 1.44, and 1.25 for stable heavy drinkers and 1.39, 1.45, and 1.40 for new heavy drinkers.

Changes in alcohol intake and adjusted relative ORs of weight gain (>4%) over 5 years in 6,832 men with data on weight change and no history of diabetes

Variables	Age-adjusted weight gain, odds ratio (95% CI)	Adjusted weight gain[2], odds ratio (95% CI)	Adjusted weight gain[3], odds ratio (95% CI)
Stable: None - Occasional (n = 1733)	1.00	1.00	1.00
Stable: Light - Moderate (n = 1354)	0.93 (0.79, 1.08)	0.97 (0.82, 1.14)	0.96 (0.81, 1.12)
Stable: Heavy (n = 1341)	1.25 (1.07, 1.46)[4]	1.19 (1.02, 1.40)[4]	1.29 (1.10, 1.51)[4]
Changed: Light - Moderate to None - Occasional (n = 292)	1.16 (0.89, 1.51)	1.14 (0.87, 1.49)	1.14 (0.86, 1.50)
Changed: None - Occasional to Light - Moderate (n = 669)	0.87 (0.71, 1.06)	0.89 (0.72, 1.09)	0.91 (0.74, 1.11)

Changed: Exheavy (n = 1171)	1.04 (0.88, 1.21)	0.97 (0.82, 1.14)	1.04 (0.88, 1.23)
Changed: New Heavy (n = 272)	1.24 (0.95, 1.63)	1.34 (1.02, 1.77)[4]	1.45 (1.09, 1.92)[4]

[2]Adjusted for age, social class, physical activity, and cigarette smoking

[3]Also adjusted for initial BMI

[4]Significantly different from the stable none - occasional group, $P < 0.05$

Author Conclusion:

In this cohort of middle-aged men, a positive relation was seen between alcohol consumption and current body weight irrespective of the type of drink consumed. In prospective analyses, heavy drinking was associated with increased weight gain, and this was most apparent in men who had never smoked. Heavy drinking in this study amounted to ≥30 g alcohol per day on average and included weekend drinking of >60 g per day and daily drinking of ≥30 g per day. Although there is no evidence that light-to-moderate drinking (≤30 g alcohol) is associated with weight gain, the findings in this study support the concept that greater alcohol consumption contributes directly to weight gain and obesity in men.

Reviewer Comments:

Alcohol intake and weight was self-reported at year 5. Alcohol intake at baseline validated through blood sampling. Authors note that findings cannot be generalized to women.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1. Was the research question clearly stated? Yes

1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes

4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	No
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	No
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	No
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes

7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	???
7.6.	Were other factors accounted for (measured) that could affect outcomes?	???
7.7.	Were the measurements conducted consistently across groups?	N/A
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes